Virchows Archiv A Pathol Anat (1989) 415:161–167

Virchows Archiv A
Pathological Anatomy and Histopathology

Case report

Primary sarcomatoid carcinoma of the adrenal gland

First case report

G. Collina [1], F. Maldarizzi [2], C.M. Betts [3], and V. Eusebi [1]

[1] Istituto di Anatomia e Istologia Patologica, [2] Clinica Chirurgica II, Policlinico S. Orsola,
[3] Dipartimento di Patologia Sperimentale, Università di Bologna, Italy

Summary. The first case of a sarcomatoid carcinoma of the adrenal gland is reported. The patient, a 68-year old woman, developed a recurrence two months after presentation and died of the disease 7 months later with multiple metastases. The differential diagnosis of this entity is discussed and its aggressive behaviour is emphasized.

Key words: Sarcomatoid carcinoma – Adrenal gland

Introduction

Sarcomatoid carcinomas are mono or biphasic tumours showing carcinomatous and sarcomatous features at the same time (Leventon and Evans 1981; Weidner 1987; Meis et al. 1987). In spite of being rare neoplastic conditions they have been recognized in most organs and tissues (Weidner 1987; Meis et al. 1987; Eusebi et al. 1989). Cases have been reported in the skin (Martin and Stewart 1935), respiratory and digestive tracts (Zarbo et al. 1986; Weidner 1987), salivary glands (Eusebi et al. 1984; Auclair et al. 1986), urogenital tract (Saphir and Vass 1938; Steeper et al. 1983; Wick et al. 1985), thyroid (Carcangiu et al. 1985), liver (Saphir and Vass 1938), gallbladder (Saphir and Vass 1938), conjunctiva (Choen et al. 1980) and central nervous system (Giangaspero et al. 1984). The breast is an additional site in which these tumours have been found (Oberman 1987; Eusebi et al. 1989).

The purpose of this paper is to report a case of sarcomatoid carcinoma of the right adrenal gland; a site not hitherto mentioned in the literature.

Offprint requests to: V. Eusebi, Istituto di Anatomia e Istologia Patologica, Policlinico S. Orsola, Via Massarenti, 9, 40138 Bologna, Italy

Case report

A 68-year old woman was admitted to hospital in December 1987 for abdominal discomfort of three months duration. On physical examination right upper abdomen was tender. Haematology screen and serum chemistry, including adrenal hormones, were normal. No haematuria was present. A CT scan revealed a large mass replacing the right adrenal gland which displaced the kidney and the vena cava (Fig. 1). No other lesions were seen elsewhere. Arteriography showed that the mass was directly supplied by adrenal blood vessels (Fig. 2).

At surgery the mass was easily dissected from the right kidney and vena cava which were not involved by the neoplastic process.

Two months after the operation the patient was readmitted to hospital with a subcutaneous nodule localized in the right lumbar region which proved to be a metastasis from the adrenal tumour. At the same time an osteolytic area of the third lumbar vertebra was discovered. Radiotherapy (8000 cGy) was administered. One month later a CT scan revealed multiple metastases to the right lung, liver and abdomen. In spite of the chemotherapy (Cisplatinum 60 mg/m2 combined with Etoposide 8 mg/m2), the recurrences enlarged and the patient died with cachexia 6 months later. No autopsy was requested.

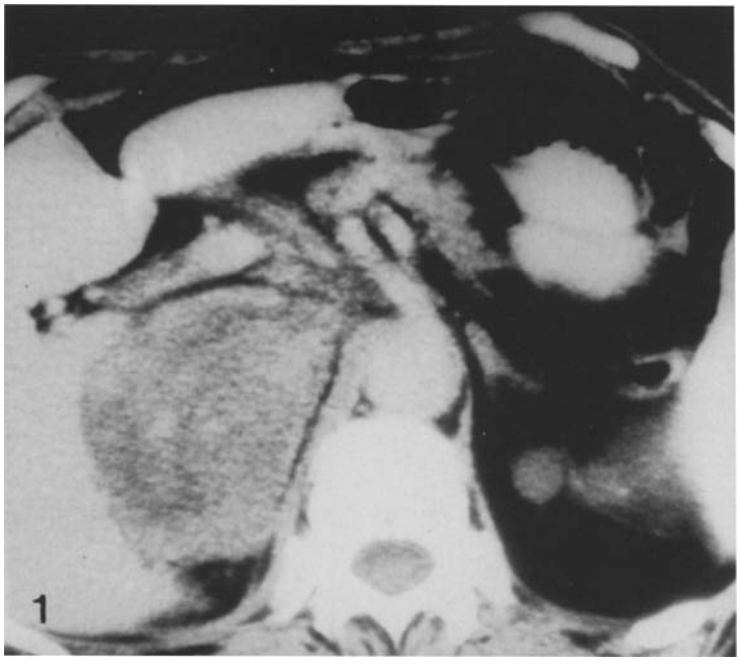
Materials and methods

Tumour tissue was fixed in 10% buffered formalin and processed and stained routinely for histology and electron microscopy.

For immunocytochemistry, the streptavidin-biotin-peroxidase method (Hsu et al. 1981) was used. Primary antibodies employed are reported in Table 1. Controls consisted of incubation of sections with normal serum of equivalent dilution instead of the primary antiserum. Sections of known positivity and negativity were stained in each batch of paraffin sections.

Results

The mass measured 11 cm across and was well circumscribed. The cut surface appeared grey-white with several necrotic and haemorrhagic areas. At



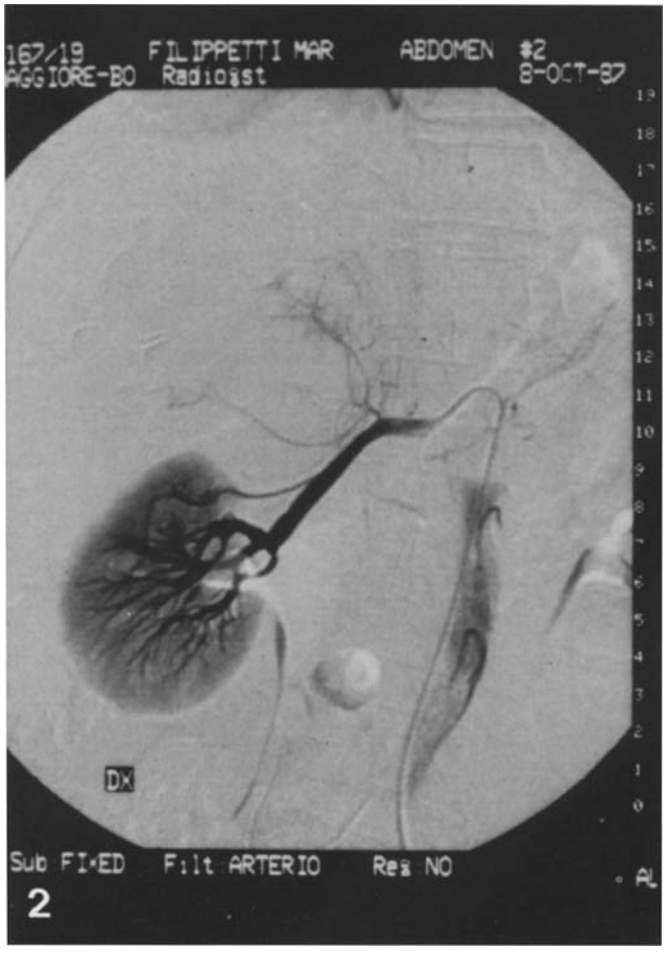


Fig. 1. CT scan demonstrates that the mass replaces the right adrenal gland and displaces the kidney and vena cava

Fig. 2. Selective arteriography of the right renal artery: the kidney appears displaced towards the lower abdominal cavity and the adrenal mass is supplied by branches of the lower adrenal artery

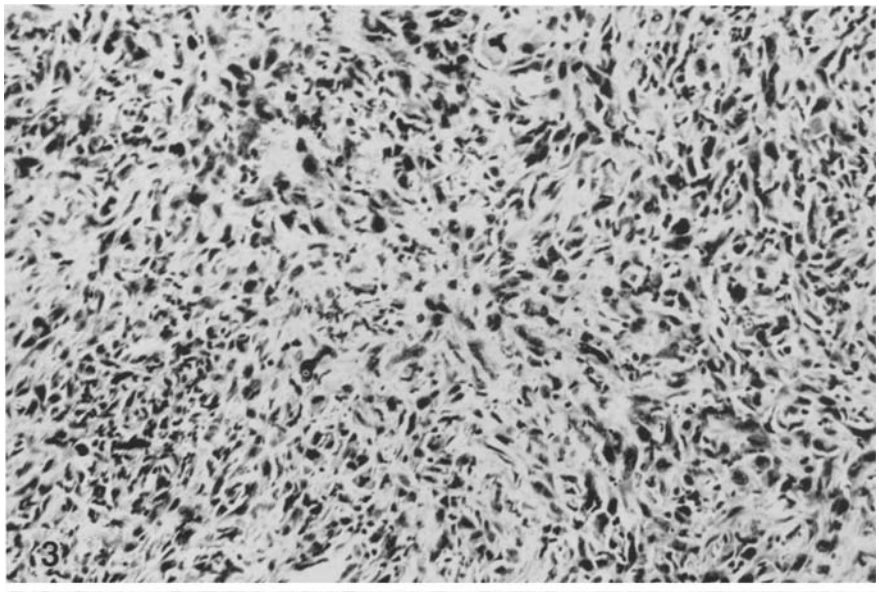
Table 1. Antibodies used in immunocytochemistry

Antibodies	M/P	Source	Dilution
Chromogranin A	M	R.V. Lloyd Michigan USA	1:120
Keratin EAB 903	M	Ortho Diagnostic Systems	1:1500
Keratin EAB 902	M	Ortho Diagnostic Systems	1:1500
Smooth-Muscle α-Actin	M	G. Gabbiani Geneva	1:2000
Vimentin	M	Dakopatts	1:200
Desmin	P	Dakopatts	1:300
S-100 Protein	P	Dakopatts	1:3600

M = monoclonal; P = polyclonal

one edge of the tumour a narrow yellow rim of residual adrenal gland tissue was evident.

On microscopy the superficial appearance of the tumour appeared to be that of a fibrosarcoma. The neoplastic cells were arranged in cartwheel or fascicular patterns (Fig. 3). Necrotic and haemorrhagic areas were conspicuous. Some cells were polygonal but the majority was composed of spindle shaped elements with abundant eosinophilic cytoplasm. Nuclei were ovoid to round showing dense clumped chromatin and small eosinophilic nucleoli (Fig. 4). Frequent abnormal mitotic figures were seen. Occasional neoplastic giant cells with multiple irregular nuclei were also present. Several clumps of lymphocytes and plasma cells were also seen throughout the tumour. A fibrous capsule sur-



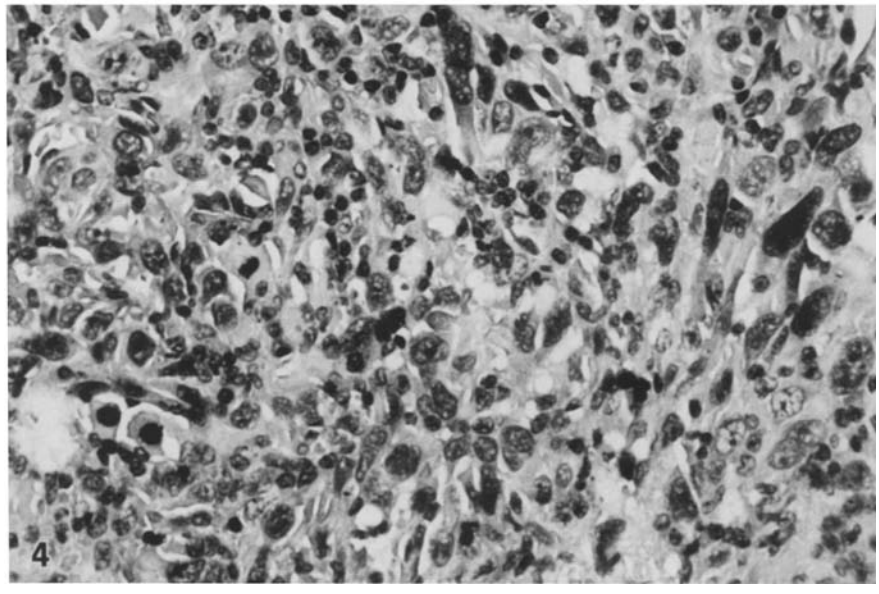


Fig. 3. The neoplastic cells are arranged in cartwheel and fascicular patterns (H & E ×100)

Fig. 4. The same cells display different shapes and their nuclei appear irregular with clumped chromatin (H & E ×350)

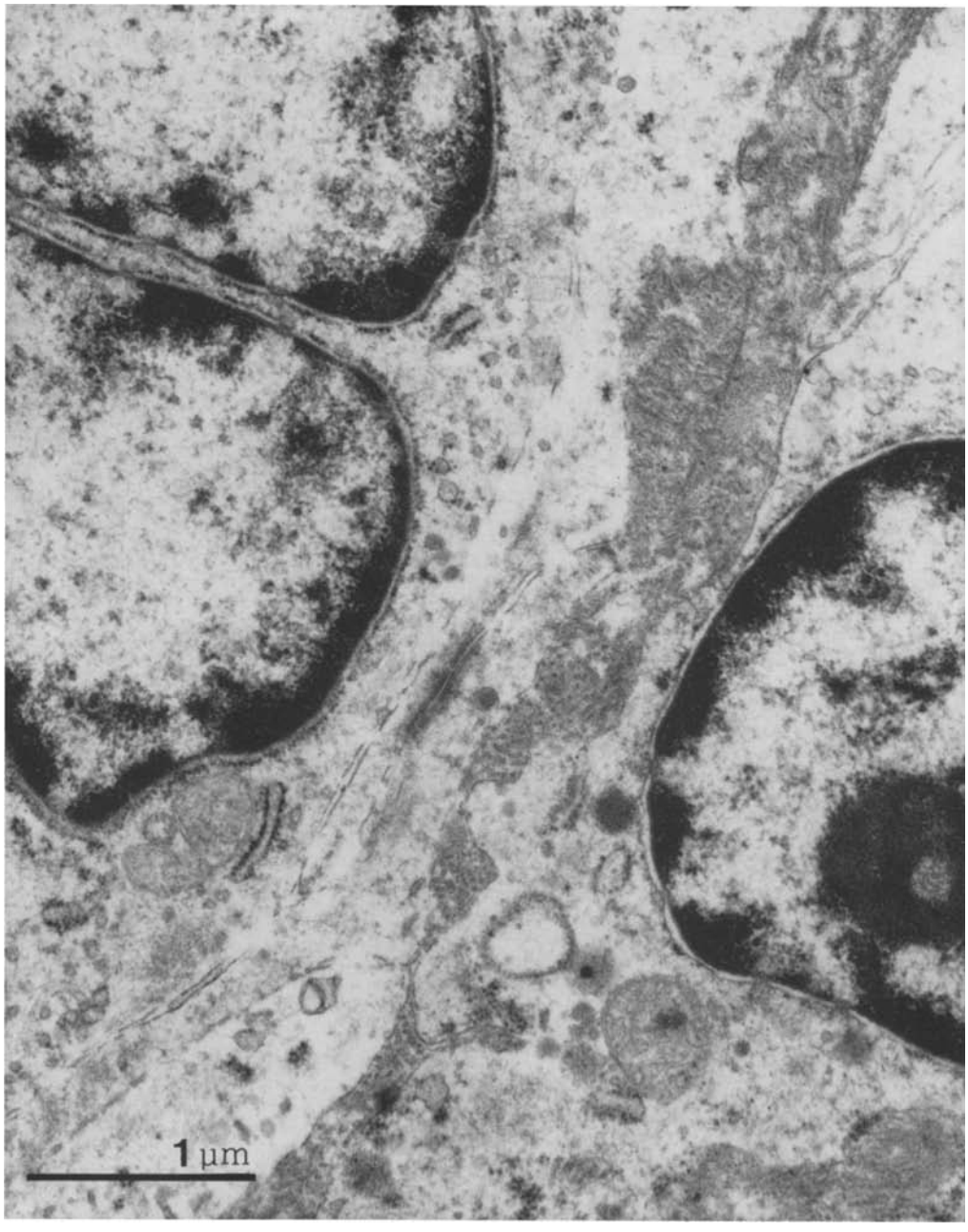


Fig. 5. A well formed desmosome connects two neoplastic cells (E.M. ×32000)

rounded the neoplastic cells which were also delimited, over a small area, by a residue of adrenal gland consisting of compressed medulla and cortex. At electron microscopy well formed desmosomes with attachment plaques were observed joining the neoplastic cells (Fig. 5). Round to oblong mitochondria and rare intermediate filaments were present in the cytoplasm.

The tumour cells were immunologically reactive when antibodies to low-weight keratin (Fig. 6) and vimentin were employed. Negative staining was obtained when the other antibodies were used. Chromogranin antibody reacted strongly with the chromaffin cells present in the residual medulla (Fig. 7). These same cells were immunologically negative when anti-keratin and anti-vimentin antibodies were employed.

Discussion

The present case showed a malignant cellular population structurally similar to a fibrosarcoma but

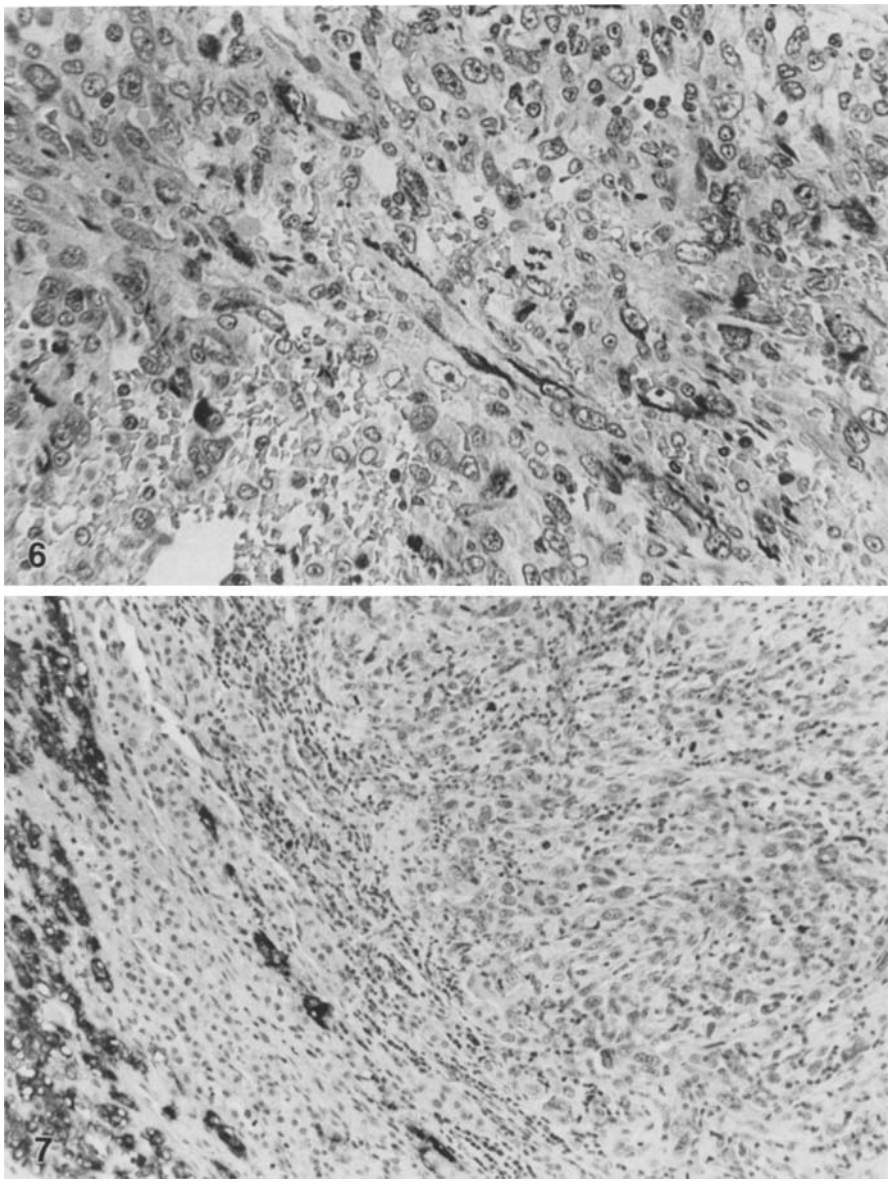


Fig. 6. Several neoplastic elements show intense cytoplasmic immunoreactivity with the anti-low weight keratin antibody (Streptavidin-Biotin-Peroxidase complex ×250)

Fig. 7. The residual chromaffin cells of the adrenal medulla appear stained with the chromogranin antibody. On the contrary the neoplastic elements are not immunoreactive (Streptavidin-Biotin-Peroxidase complex ×100)

immunologically expressing low-weight keratin in addition to vimentin. Ultrastructurally the neoplastic cells displayed well formed desmosomes, together with rare cytoplasmic intermediate filaments. Sarcomatoid carcinomas have different histological appearances (Weidner 1987; Bonsib et al. 1987; Ro et al. 1987; Eusebi et al. 1989), of which a spindle-cell fibrosarcoma-like pattern is a distinct possibility (Ro et al. 1987; Eusebi et al. 1989).

CT scan and surgery demonstrated that the tumour was localized in the right adrenal gland and did not involve the kidney. In addition angiography showed that the tumour was supplied by adrenal blood vessels. These features together with the lack of involvement of other organs, as revealed by the CT scan, strongly support the right adrenal gland as the primary origin of the tumour. No clinical or biochemical sign of adrenal hormonal increase were evident.

The present lesion was histologically indistinguishable from a fibrosarcoma. However, this latter type of tumour occurs more frequently in a younger age group and involves bones, tendon sheets and skin (Enzinger and Weiss 1988). Moreover, desmosomes and the presence of keratin are very probative data of carcinomatous differentiation in a spindle cell neoplasia (Battifora 1976; Piscioli et al. 1984). In addition the immunological profile shown by the present case is in keeping with the data of Henzen-Logmans et al. (1988) in adrenal cortex carcinoma. Retroperitoneal leio-

myosarcomas may involve the kidneys, adrenal glands and vertebrae and vimentin and keratins are present in these tumours (Miettinen 1988; Ramaekers et al. 1988) but in contrast to the present case, leiomyosarcomas also contain smooth muscle actin (Schurch et al. 1987). Malignant fibrous histiocytoma (MFH) can be morphologically similar to sarcomatoid carcinoma but vimentin is the only intermediate filament found (Denk et al. 1983) unlike the findings in the present case. Recently, Weiss et al. (1988), reported a case of post-irradiation malignant fibrous histiocytoma expressing low-weight keratin. The patient had undergone intracavitary radiotherapy 8 years previously following an adenocarcinoma. Although the presence of cytokeratin in sarcomas is a possibility (Miettinen et al. 1982; Chase et al. 1984), in the case reported by Weiss et al. (1988) a cautious position must be adopted, as a recurrence of the previous carcinoma cannot be ruled out. Synovial sarcomas localized in the retroperitoneum have also been reported (Eusebi and Russomanno 1969; Shmookler 1982) and the monophasic form of this tumour might be morphologically and immunocytochemically indistinguishable from a spindle cell carcinoma. Nevertheless the lesion reported here was confined to the adrenal gland and it seems highly improbable that a synovial sarcoma would be confined to this gland.

Ovarian thecal metaplasia (Wong and Warner 1971) and benign spindle cell tumours recently described by Carney (1987), can be easily ruled out due to the lack of atypia of neoplastic elements in these latter cases.

Finally, anaplastic phaeochromocytoma can be confidently ruled out as these tumours do not express keratins (Hoefler et al. 1986) while they are chromogranin-rich. This protein was not localized in the neoplastic cells of the present tumour, although the residual chromaffin cells in the medulla were stained strongly positive.

The patient had a metastatic subcutaneous nodule shortly after the operation and an osteolytic area was apparent in the third lumbar vertebra. After three months metastases to the right lung, liver and abdominal cavity were discovered and the patients died 6 months later. Therefore, it appears that the aggressive biological behaviour of the present tumour is consistent with similar lesions originating in other sites (Zarbo et al. 1986; Weidner 1987; Eusebi et al. 1989).

The aim of this paper is to draw attention to the first case of sarcomatoid carcinoma of the adrenal gland, and to its ominous prognosis.

Acknowledgements. Work supported with grants of M.P.I. (Rome) 40%–60%. Dr. C. Ceccarelli has to be thanked for performing the immunocytochemistry.

References

Auclair PL, Langloss JM, Weiss SW, Corio RL (1986) Sarcomas and sarcomatoid neoplasms of the major salivary gland regions. Cancer 58:1305–1315

Battifora H (1976) Spindle cell carcinoma. Ultrastructural evidence of squamous origin and collagen production by the tumor cells. Cancer 37:2275–2282

Bonsib SM, Fischer J, Plattner S, Fallon B (1987) Sarcomatoid renal tumors. Clinicopathologic correlation of three cases. Cancer 59:527–532

Carcangiu ML, Steeper T, Zampi G, Rosai J (1985) Anaplastic thyroid carcinoma. A study of 70 cases. Am J Clin Pathol 83:135–158

Carney JA (1987) Unusual tumefactive spindle-cell lesions in the adrenal glands. Hum Pathol 18:980–985

Chase RD, Enzinger FM, Weiss SW, Langloss JM (1984) Keratin in epitheliod sarcoma. An immunohistochemical study. Am J Surg Pathol 8:435–441

Choen B, Green R, Iliff NT, Taxy JB, Schwab LT, de la Cruz Z (1980) Spindle cell carcinoma of the conjunctiva. Arch Ophthalmol 98:1809–1813

Denk H, Krepler R, Artlieb U, Gabbiani G, Rungger-Brandle E, Leoncini P, Franke WW (1983) Proteins of intermediate filaments. An immunohistochemical and biochemical approach to the classification of soft tissue tumors. Am J Pathol 110:193–208

Enzinger FM, Weiss SW (1988) Fibrosarcoma. In Soft Tissue Tumors, second edition. C.V. Mosby, St Louis, pp 201–222

Eusebi V, Russomanno E (1969) Su un caso di sinovialosarcoma a localizzazione retroperitoneale. Archivio Italiano di Anatomia e Istologia Patologica 43:260–270

Eusebi V, Martin SA, Govoni E, Rosai J (1984) Giant cell tumor of major salivary glands: report of three cases, one occurring in association with a malignant mixed tumor. Am J Clin Pathol 81:666–674

Eusebi V, Cattani MG, Ceccarelli G, Lamovec J (1989) Sarcomatoid carcinomas of the breast. An immunocytochemical study of 14 cases. Progress in Surgical Pathology (in press)

Giangaspero F, Manetto V, Ferracini R, Piazza G (1984) Squamous cell carcinoma of the brain with sarcoma-like stroma. Virchows Archiv [A] 402:459–464

Henzen-Logmans SC, Stel HV, Van Muijen GNP, Mullink H, Meijer CJLM (1988) Expression of intermediate filament proteins in adrenal cortex and related tumours. Histopathology 12:359–372

Hoefler H, Denk H, Lackinger E, Helleis G, Polak JM, Heitz PhU (1986) Immunocytochemical demonstration of intermediate filament cytoskeleton proteins in human endocrine tissues and (neuro-) endocrine tumours. Virchows Archiv [A] 409:609–626

Hsu SM, Raine L, Fanger H (1981) The use of avidin-biotin-peroxidase complex (ABC) in immunoperoxidase techniques: a comparison between ABC and unlabeled antibody (PAP procedures). J Histochem Cytochem 29:577–580

Leventon GS, Evans HL (1981) Sarcomatoid squamous cell carcinoma of the mucous membranes of the head and neck: a clinicopathologic study of 20 cases. Cancer 48:994–1003

Martin HE, Stewart FW (1935) Spindle-cell epidermoid carcinoma. Am J Cancer 24:273–298

Meis JM, Ordonez NG, Gallager HS (1987) Sarcomatoid carci-

noma of the breast: an immunohistochemical study of six cases. Virchows Archiv [A] 410:415–421
Miettinen M (1988) Immunoreactivity for cytokeratin and epithelial membrane antigen in leiomyosarcoma. Arch Pathol Lab Med 112:637–640
Miettinen M, Lehto V-P, Virtanen I (1982) Keratin in epithelial-like cells of classical biphasic synovial sarcoma. Virchows Archiv [B] 40:157–161
Oberman HA (1987) Metaplastic carcinoma of the breast. A clinicopathologic study of 29 patients. Am J Surg Pathol 11:918–929
Piscioli F, Aldovini D, Bondi A, Eusebi V (1984) Squamous cell carcinoma with sarcoma-like stroma of the nose and paranasal sinuses: report of two cases. Histopathology 8:633–639
Ramaekers FCS, Pruszczynski M, Smedts F (1988) Cytokeratins in smooth muscle cells and smooth muscle tumours. Histopathology 12:558–561
Ro JY, Ayala AG, Sella A, Samuels ML, Swanson DA (1987) Sarcomatoid renal cell carcinoma: clinicopathologic. A study of 42 cases. Cancer 59:516–526
Saphir O, Vass A (1938) Carcinosarcoma. Am J Cancer 33:331–361
Schurch W, Skalli O, Seemayer TA, Gabbiani G (1987) Intermediate filament proteins and actin isoforms as markers for soft tissue tumor differentiation and origin. I smooth muscle tumors. Am J Pathol 128:91–103
Shmookler BM (1982) Retroperitoneal synovial sarcoma. A report of four cases. Am J Clin Pathol 77:686–691
Steeper TA, Piscioli F, Rosai J (1983) Squamous cell carcinoma with sarcoma-like stroma of the female genital tract. Clinicopathologic study of four cases. Cancer 52:890–898
Weidner N (1987) Sarcomatoid carcinoma of the upper aerodigestive tract. Seminars in Diagnostic Pathology 4:157–168
Weiss SW, Bratthauer GL, Morris PA (1988) Postirradiation malignant fibrous histiocytoma expressing cytokeratin. Implication for the immunodiagnosis of sarcomas. Am J Surg Pathol 12:554–558
Wick MR, Perrone TL, Burke BA (1985) Sarcomatoid transitional cell carcinomas of renal pelvis. An ultrastructural and immunohistochemical study. Arch Pathol Lab Med 109:55–58
Wong T-W, Warner NE (1971) Ovarian thecal metaplasia in the adrenal gland. Arch Path 92:319–328
Zarbo RJ, Crissman JD, Venkat H, Weiss MA (1986) Spindle-cell carcinoma of the upper aerodigestive tract mucosa. Am J Surg Pathol 10:741–753

Received January 25, 1989 / Accepted February 24, 1989